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G70-D GENERAL PERMIT ENGINEERING EVALUATION

PREVENTION AND CONTROL OF AIR POLLUTION IN REGARD TO THE CONSTRUCTION, MODIFICATION, RELOCATION, ADMINISTRATIVE UPDATE AND OPERATION OF NATURAL GAS PRODUCTION FACILITIES LOCATED AT THE WELL SITE

APPLICATION NO.: G70-D**180A**

FACILITY ID: **085-00054**

☐ CONSTRUCTION
☒ MODIFICATION
☐ RELOCATION

☐ CLASS I ADMINISTRATIVE UPDATE
☐ CLASS II ADMINISTRATIVE UPDATE

BACKGROUND INFORMATION

Name of Applicant (as registered with the WV Secretary of State's Office): Antero Resources Corporation

Federal Employer ID No. (FEIN): 80-0162034

Applicant's Mailing Address: 1615 Wynkoop Street

City: Denver

State: CO

ZIP Code: 80202

Facility Name: Lockhart Heirs West Wellpad

Operating Site Physical Address: 1132 Oxford Rd.
If none available, list road, city or town and zip of facility.

City: Pullman

Zip Code: 26421

County: Ritchie

Latitude & Longitude Coordinates (NAD83, Decimal Degrees to 5 digits):

Latitude: 39.18986

Longitude: -80.92798

SIC Code: 1311
NAICS Code: 211111

Date Application Received:
December 12, 2016

Fee Amount: \$1,500

Date Fee Received: December 13, 2016

Applicant Ad Date: December 21, 2016

Newspaper: The Pennsboro News

Date Application Complete: February 8, 2017

Due Date of Final Action: March 25, 2017

Engineer Assigned: David Keatley

Description of Permitting Action: Installation and operation of one (1) 550-watt thermoelectric generator. Modification of emissions from each enclosed combustor. Removal of one (1) 12-mmBtu/hr enclosed combustor and eight (8) 2.0-mmBtu/hr line heaters.

PROCESS DESCRIPTION

A mixture of condensate and entrained gas from the three existing wells enters the facility through a number of low pressure separators where the gas phase is separated from the liquid phase. Gas Production Units (H001-H008) and Line Heaters (LH001-LH008) are used in conjunction with the separators to help separate the gas from the liquid phases. These heaters are fueled by a slip stream of the separated gas. The separated gas from the low pressure separators is sent to the sales gas compressor (ENG001). The compressed gas is then metered and sent to the sales gas pipeline. The separated condensate and water from the separators flow to their respective storage tanks (TANKCOND001-010 and TANKPW001-002).

The facility has ten tanks (TANKCOND001-010) on site to store condensate and two tanks (TANKSPW001-002) to store produced water prior to removal from the site. Flashing, working, and breathing losses from the tanks are sent to up to four enclosed combustors (EC001-EC004) to control emissions. The facility will utilize Cimmaron Model No. 48" HV ECD enclosed combustors designed to operate at 8,760 hours per year. The enclosed combustors will incorporate an automatic re-ignition system in the event the enclosed combustor is extinguished. A thermocouple will be used to monitor the presence of a pilot flame.

Condensate and produced water are transported off-site on an as-needed basis via tanker truck. The maximum annual throughput will be 18,396,000 gallons per year and 36,792,000 gallons per year for condensate and produced water, respectively. Truck loading connections are in place to pump condensate and produced water (L001 & L002) from the storage tanks into tanker trucks. Emissions from the loading operations are vented to the atmosphere.

Emissions from the facility's emission sources were calculated using the extended analysis of the condensate and produced water from Prunty No.1H, one of the wells in the Lockhart Heirs Pad. These extended analysis are considered representative of the materials from Lockhart Heirs West, being in the same Marcellus rock formation. The flashing, working & breathing losses from the tanks are sent to vapor combustors. The enclosed combustors that will be used to control tank emissions is designed to achieve a VOC destruction efficiency of 98%.

SITE INSPECTION

Site Inspection Date: November 17, 2015

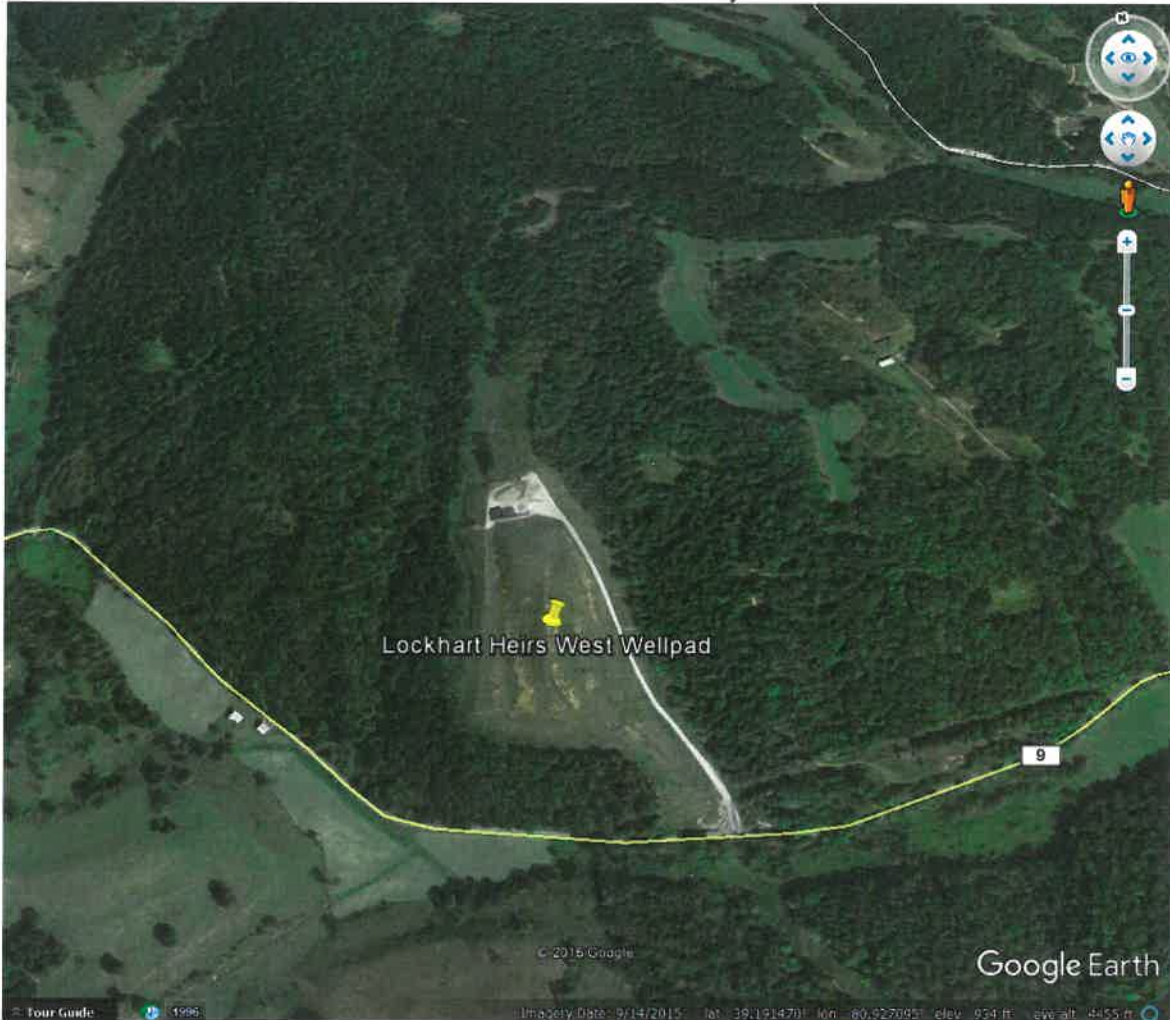
Site Inspection Conducted By: James Robertson

Results of Site Inspection: During the visit, the site was being actively graded but no wells had been drilled and no processing equipment was onsite. The pad is located on top of a hill in a relatively remote area, overlooking CR9. The closest house is approximately 1000' away.

Did Applicant meet Siting Requirements? Yes

If applicable, was siting criteria waiver submitted? Not Applicable

Directions to Facility: From US-50W, turn left onto WV-74S. Travel on WV 74 south for approximately 7.4 miles and turn left onto Main Street. Travel on Main Street for approximately 0.2 miles continue onto Harrisville-Pullman Oxford. The facility will be on the left.



ESTIMATE OF EMISSIONS BY REVIEWING ENGINEER

The following table indicates which methodology was used in the emissions determination:

Emission Unit ID#	Process Equipment	Calculation Methodology (e.g. ProMax, GlyCalc, mfg. data, AP-42, etc.)
GPU001 through GPU008	Gas Production Unit Heaters	EPA AP-42 emission factors
LH001 through LH008	Line Heaters	EPA AP-42 emission factors
TANKCOND001 through TANKCOND010	Condensate Tanks	Promax using liquid and gas samples from this facility.
TANKPW001 and TANKPW002	Produced Water Tanks	Promax using liquid and gas samples from this facility.
L001 and L002	Condensate and Produce Water Truck Loading	EPA AP-42 equation, submerged loading, dedicated service
EC001 through EC003	Enclosed Combustors	EPA AP-42 emission factors
TEG001	Thermoelectric Generator	EPA AP-42 emission factors

The total facility PTE for the facility (excluding fugitive emissions) is shown in the following table:

Pollutant	Facility Wide PTE (tons/year)
Nitrogen Oxides	16.37
Carbon Monoxide	77.19
Volatile Organic Compounds	42.17
Particulate Matter	0.48
Particulate Matter-10/2.5	0.48
Sulfur Dioxide	0.03
Formaldehyde	0.03
Benzene	0.06
Toluene	0.05
Ethylbenzene	0.02
Xylenes	0.03
n-Hexane	0.38
Total HAPs	1.39
Carbon Dioxide Equivalent	11,704

Emission Point ID	Emission Unit ID	Emission Source	Pollutant	Maximum Hourly Emissions (lb/hr)	Maximum Annual Emissions (tpy)
EP-EC001 through EP-EC003	TANKCOND001 through TANKCOND010, TANKPW001, TANKPW002, and EC001 through EC003	Cimarron 48" Enclosed Combustors (Controlling: Produced Water Tanks and Condensate Tanks) Emissions per Each	Nitrogen Oxides	0.82	3.58
			Carbon Monoxide	3.72	16.30
			Volatile Organic Compounds	2.49	10.89
			Total Particulate Matter	0.01	0.05
			Benzene	<0.01	0.02
			Toluene	<0.01	0.02
			Xylenes	<0.01	0.01
			n-Hexane	0.09	0.38
			CO ₂ e	494	11,704
EP-GPU001 through EP-GPU008	EU-GPU001 through EU-GPU008	Gas Production Unit Burners 1.5 mmBtu/hr	Nitrogen Oxides	0.12	0.53
			Carbon Monoxide	0.11	0.45
			Volatile Organic Compounds	0.01	0.03
			Total Particulate Matter	0.01	0.04
			CO ₂ e	145	636
EP-ENG001	ENG001	High-Pressure VRU Compressor Engine Kubota DG972-E2 24 bhp	Nitrogen Oxides	0.32	1.39
			Carbon Monoxide	5.65	24.73
			Volatile Organic Compounds	0.01	0.04
			Total Particulate Matter	<0.01	0.01
			CO ₂ e	28	122
EP-TEG001	TEG-001	Thermoelectric Generator 0.019 mmBtu/hr	Nitrogen Oxides	0.01	0.04
			Carbon Monoxide	0.01	0.03
			CO ₂ e	9	38

EP-L001	L001	Condensate Truck Loading 1,839,600 gallons/year	Volatile Organic Compounds	10.14	9.25
			Hexane	0.03	0.03
			CO ₂ e	3	3
EP-L002	L002	Produced Water Truck Loading 36,792,200 gallons/year	Volatile Organic Compounds	<0.01	<0.01
			CO ₂ e	1	2

REGULATORY APPLICABILITY

45CSR2 (Particulate Air Pollution from Combustion of Fuel in Indirect Heat Exchangers)

The purpose of 45CSR2 (Particulate Air Pollution from Combustion of Fuel in Indirect Heat Exchangers) is to establish emission limitations for smoke and particulate matter which are discharged from fuel burning units.

45CSR2 states that any fuel burning unit that has a heat input under ten (10) MMBTU/hr is exempt from Sections 4 (weight emission standard), 5 (control of fugitive particulate matter), 6 (registration), 8 (testing, monitoring, recordkeeping, reporting) and 9 (startups, shutdowns, malfunctions). However, failure to attain acceptable air quality in parts of some urban areas may require the mandatory control of these sources at a later date. If the individual heat input of all of the proposed fuel burning units are below 10 MMBTU/hr, these units are exempt from the aforementioned sections of 45CSR2. However, the registrant would be subject to the opacity requirements in 45CSR2, which is 10% opacity based on a six minute block average. Fuel burning units greater than 10 MMBTU/hr are ineligible for registration under General Permit G70-D

Emission Unit ID#	Emission Unit Description	Maximum Design Heat Input (MDHI) (MMBTU/hr)
GPU001 through GPU008	Gas Production Unit Heaters	1.5 (each)
LH001 through LH008	Line Heaters	2.0 (each)
TEG001	Thermoelectric Generator	0.0019

45CSR6 (To Prevent and Control Air Pollution from the Combustion of Refuse)

45CSR6 prohibits open burning, establishes emission limitations for particulate matter, and establishes opacity requirements. Sources subject to 45CSR6 include completion combustion devices, enclosed combustion devices, and flares.

The facility-wide requirements of the general permit include the open burning limitations §§45-6-3.1 and 3.2.

All completion combustion devices, enclosed combustion devices, and flares are subject to the particulate matter weight emission standard set forth in §45-6-4.1; the opacity requirements in §§45-6-4-3 and 4-4; the visible emission standard in §45-6-4.5; the odor standard in §45-6-4.6; and, the testing standard in §§45-6-7.1 and 7.2.

Enclosed combustion control devices and flares that are used to comply with emission standards of NSPS, Subpart OOOO are subject to design, operational, performance, recordkeeping and reporting requirements of the NSPS regulation that meet or exceed the requirements of 45CSR6.

Emission Unit ID#	Maximum Design Heat Input (MDHI) (MMBTU/hr)	Subject to Weight Emission Standard?	Control Efficiency Claimed by Registrant	Provide Justification how 45CSR6 is met.
EC001 through EC003	12 (each)	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	98%	The estimated total particulate matter emissions from each combustor is 0.02 lb/hr is less than the maximum allowable particulate emissions of 1.35 lb/hr.

45CSR10 (To Prevent and Control Air Pollution from the Emission of Sulfur Oxides)

45CSR10 establishes emission limitations for SO₂ emissions which are discharged from stacks of fuel burning units. A “fuel burning unit” means and includes any furnace, boiler apparatus, device, mechanism, stack or structure used in the process of burning fuel or other combustible material for the primary purpose of producing heat or power by indirect heat transfer. Sources that meet the definition of “Fuel Burning Units” per 45CSR10-2.8 include GPUs, in-line heaters, heater treaters, and glycol dehydration unit reboilers.

Fuel burning units less than 10 MMBtu/hr are exempt. The sulfur dioxide emission standard set forth in 45CSR10 is generally less stringent than the potential emissions from a fuel burning unit for natural gas. The SO₂ emissions from a fuel burning unit will be listed in the G70-D permit registration at the discretion of the permit engineer on a case-by-case basis. Issues such as non-attainment designation, fuel use, and amount of sulfur dioxide emissions will be factors used in this determination. Fuel burning units greater than 10 MMBTU/hr are ineligible for registration under General Permit G70-D

Fuel burning units burning natural gas are exempt from Section 8 (Monitoring, Recording and Reporting) as well as interpretive rule 10A. The G70-D eligibility requirements exclude from eligibility any fuel burning unit that does not use natural gas as the fuel; therefore, there are no permit conditions for 45CSR10.

Emission Unit ID#	Emission Unit Description	Maximum Design Heat Input (MDHI) (MMBTU/hr)
GPU001 through GPU008	Gas Production Unit Heaters	1.5 (each)
LH001 through LH008	Line Heaters	2.0 (each)
TEG001	Thermoelectric Generator	0.0019

45CSR13 (Permits for Construction, Modification, Relocation and Operation of Stationary Sources of Air Pollutants, Notification Requirements, Administrative Updates, Temporary Permits, General Permits, and Procedures for Evaluation)

45CSR13 applies to this source due to the fact that the applicant is defined as a “stationary source” under 45CSR13 Section 2.24.b. *Stationary source* means, for the purpose of this rule, any building, structure, facility, installation, or emission unit or combination thereof, excluding any emission unit which meets or falls below the criteria delineated in Table 45-13B which: (a) is subject to any substantive requirement of an emission control rule promulgated by the Secretary; (b) discharges or has the potential to discharge more than six (6) pounds per hour and ten (10) tons per year, or has the potential to discharge more than 144 pounds per calendar day, of any regulated air pollutant; (c) discharges or has the potential to discharge more than two (2) pounds per hour or five (5) tons per year of hazardous air pollutants considered on an aggregated basis; (d) discharges or has the potential to discharge any air pollutant(s) listed in Table 45-13A in the amounts shown in Table 45-13A or greater; or, (e) an owner or operator voluntarily chooses to be subject to a construction or modification permit pursuant to this rule, even though not otherwise required to do so. 45CSR13 has an original effective date of June 1, 1974.

The applicant meets the definition of a stationary source because (check all that apply):

- ☒ Subject to a substantive requirement of an emission control rule promulgated by the Secretary.
- ☒ Discharges or has the potential to discharge more than six (6) pounds per hour and ten (10) tons per year, or has the potential to discharge more than 144 pounds per calendar day, of any regulated air pollutant.
- ☐ Discharges or has the potential to discharge more than two (2) pounds per hour or five (5) tons per year of hazardous air pollutants considered on an aggregated basis.
- ☐ Discharges or has the potential to discharge any air pollutant(s) listed in Table 45-13A in the amounts shown in Table 45-13A or greater.
- ☐ Voluntarily chooses to be subject to a construction or modification permit pursuant to this rule, even though not otherwise required to do so.

General Permit G70-D Registration satisfies the construction, modification, relocation and operating permit requirements of 45CSR13. General Permit G70-D sets forth reasonable conditions that enable eligible registrants to establish enforceable permit limits.

Section 5 of 45CSR13 provides the permit application and reporting requirements for construction of and modifications to stationary sources. No person shall cause, suffer, allow or permit the construction, modification, relocation and operation of any stationary source to be commenced without notifying the Secretary of such intent and obtaining a permit to construct, modify, relocate and operate the stationary source as required in the rule or any other applicable rule promulgated by the Secretary.

If applicable, the applicant meets the following (check all that apply):

- ☐ Construction
- ☒ Modification
- ☐ Class I Administrative Update (45CSR13 Section 4.2.a)
- ☐ Class II Administrative Update (45CSR13 Section 4.2.b)

45CSR16 (Standards of Performance for New Stationary Sources Pursuant to 40 CFR Part 60)

45CSR16 applies to all registrants that are subject to any of the NSPS requirements described in more detail in the Federal Regulations section. Applicable requirements of NSPS, Subparts IIII, JJJJ, OOOO and OOOOa are included in General Permit G70-D.

The applicant is subject to:

- ☐ 40CFR60 Subpart IIII
- ☒ 40CFR60 Subpart JJJJ
- ☐ 40CFR60 Subpart OOOO
- ☒ 40CFR60 Subpart OOOOa

45CSR22 (Air Quality Management Fee Program)

45CSR22 is the program to collect fees for certificates to operate and for permits to construct or modify sources of air pollution. 45CSR22 applies to all registrants. The general permit fee of \$500 is defined in 45CSR13. In addition to the application fee, all applicants subject to NSPS requirements or NESHAP requirements shall pay additional fees of \$1,000 and \$2,500, respectively.

Registrants are also required to obtain and have in effect a valid certificate to operate in accordance with 45CSR22 §4.1. The fee group for General Permit G70-D is 9M (all other sources) with an annual operating fee of \$200.

40CFR60 Subpart JJJJ (Standards of Performance for Stationary Spark Ignition Internal Combustion Engines)

Subpart JJJJ sets forth nitrogen oxides (NO_x), carbon monoxide (CO), and volatile organic compound (VOC) emission limits, fuel requirements, installation requirements, and monitoring requirements based on the year of installation of the subject internal combustion engine. The provisions for stationary spark ignition (SI) internal combustion engines for owners or operators of this Subpart have been included in General Permit G70-D, Section 13.

Emission Unit ID#	Engine Description (Make, Model)	Engine Size (HP)	Date of Manufacture	Provide Justification how 40CFR60 Subpart JJJJ is met.
ENG001	Kubota DG972-E2	24	2013	<input type="checkbox"/> Met Emission Standard <input checked="" type="checkbox"/> Certified Engine

40CFR60, Subpart OOOOa (Standards of Performance for Crude Oil and Natural Gas Production, Transmission and Distribution for which Construction, Modification or Reconstruction Commenced after September 18, 2015)

EPA published its New Source Performance Standards (NSPS) and air toxics rules for the oil and gas sector on August 16, 2012. EPA published amendments to the Subpart on September 23, 2013 and June 3, 2016.

40CFR60 Subpart OOOOa establishes emission standards and compliance schedules for the control of the pollutant greenhouse gases (GHG). The greenhouse gas standard in this subpart is in the form of a limitation on emissions of methane from affected facilities in the crude oil and natural gas source category that commence construction, modification or reconstruction after September 18, 2015. This subpart also establishes emission standards and compliance schedules for the control of volatile organic compounds (VOC) and sulfur dioxide (SO₂) emissions from affected facilities that commence construction, modification or reconstruction after September 18, 2015. The effective date of this rule is August 2, 2016.

For each well site, the registrant must reduce GHG (in the form of a limitation on emissions of methane) and VOC emissions by complying with fugitive emissions monitoring as required in §60.5397a and the alternative means of emission limitations in §60.5398a.

Gas well affected facilities are included in General Permit G70-D in Section 5.0.

Are there any applicable gas well affected facilities? ☒ Yes ☐ No

If Yes, list.

API Number	Date of Flowback	Date of Well Completion	Green Completion and/or Combustion Device	Subject to OOOOa?
47085102040000	9/13/2016	9/8/2016	Green	Yes
47085102050000	9/13/2016	9/4/2016	Green	Yes
47085102060000	9/13/2016	8/29/2016	Green	Yes
Five Additional Proposed Wells				

Each centrifugal compressor affected facility, which is a single centrifugal compressor using wet seals. A centrifugal compressor located at a well site, or an adjacent well site and servicing more than one well site, is not an affected facility under this Subpart.

Each reciprocating compressor affected facility, which is a single reciprocating compressor. A reciprocating compressor located at a well site, or an adjacent well site and servicing more than one well site, is not an affected facility under this subpart.

Pneumatic controllers affected facilities are included in General Permit G70-D, Section 10.0.

Are there any applicable pneumatic controller affected facilities? ☐ Yes ☒ No

Each pneumatic controller affected facility not located at a natural gas processing plant, which is a single continuous bleed natural gas-driven pneumatic controller operating at a natural gas bleed rate greater than 6 scfh.

Requirements for storage vessel affected facilities are included in General Permit G70-D, Section 7.0.

Are there any applicable storage vessel affected facilities? ☐ Yes ☒ No

If No, list any emission reduction devices and control efficiencies used to avoid 40CFR60 Subpart OOOO.

The enclosed vapor combustors (EC001 through EC002) will be used to achieve a minimum control efficiency of 98%.

Each storage vessel affected facility, which is a single storage vessel with the potential for VOC emissions equal to or greater than 6 tpy as determined according to this section.

Fugitive Emissions GHG and VOC Standards affected facilities are included in General Permit G70-D in Section 12.0.

Did the registrant commence construction, modification, or reconstruction of the well site after September 18, 2015 and is subject to §60.5397a? ☒ Yes ☐ No

For the purposes of §60.5397a, a "modification" to a well site occurs when a new well is drilled at an existing well site, a well at an existing well site is hydraulically fractured, or a well at an existing well site is hydraulically refractured.

A well site that only contains one or more wellheads is not an affected facility under this subpart. The affected facility status of a separate tank battery surface site has no effect on the affected facility status of a well site that only contains one or more wellheads.

Requirements for pneumatic pump affected facilities are included in General Permit G70-D, Section 16.0.

Are there any applicable pneumatic pump affected facilities at the well site? ☐ Yes ☒ No

Each pneumatic pump affected facility at the well site, which is a single natural gas-driven diaphragm pump. A single natural gas-driven diaphragm pump that is in operation less than 90 days per calendar year is not an affected facility under this subpart as well as the required records are kept.

40CFR63 Subpart ZZZZ (National Emission Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines)

Subpart ZZZZ establishes national emission limitations and operating limitations for hazardous air pollutants (HAP) emitted from stationary reciprocating internal combustion engines (RICE) located at major and area sources of HAP emissions. This Subpart also establishes requirements to demonstrate initial and continuous compliance with the emission limitations and operating limitations. This section reflects EPA's final amendments to 40 CFR part 63, Subpart ZZZZ that were issued on January 15, 2013 and published in the Federal Register on January 30, 2013.

WVDEP DAQ has delegation of the area source air toxics provisions of this Subpart requiring Generally Achievable Control Technology (GACT). The provisions of this Subpart have been included in this general permit under Section 13.0.

Emission Unit ID#	Engine Description (Make, Model)	Engine Size (HP)	Date of Manufacture	New or Existing under 40CFR63 Subpart ZZZZ?	Provide Justification how 40CFR63 Subpart ZZZZ is met.
ENG001	Kubota DG972-E2	24	2013	New	40CFR63 Subpart ZZZZ is met by meeting the requirements of 40CFR60 Subpart JJJJ.

Are there any engines that fall in the window of being new under 40CFR60 Subpart ZZZZ but manufactured before the applicability date in 40CFR60 Subpart JJJJ? ☐ Yes ☒ No

SOURCE AGGREGATION DETERMINATION

"Building, structure, facility, or installation" is defined as all the pollutant emitting activities which belong to the same industrial grouping, are located on one or more contiguous and adjacent properties, and are under the control of the same person.

Is there equipment and/or activities used for onshore oil and natural gas production that are located on the same site, or on sites that share equipment and are within ¼ mile of each other?

☐ Yes ☒ No

Is this equipment and/or activities under "common control"?

☒ Yes ☐ No

Do these facilities share the same two (2) digit SIC code?

☒ Yes ☐ No

Final Source Aggregation Decision.

☒ Source not aggregated with any other source.

☐ Source aggregated with another source. List Company/Facility Name:

RECOMMENDATION TO DIRECTOR

The information provided in the permit application, including all supplemental information received, indicates the applicant meets all the requirements of applicable regulations and the applicant has shown they meet the eligibility requirements of General Permit G70-D. Therefore, impact on the surrounding area should be minimized and it is recommended that the facility should be granted registration under General Permit G70-D.

Permit Engineer Signature: _____

Name and Title: David Keatley - NSR Permitting

Date: February 8, 2017